**REPORT**

**Section 1: Data Loading and Preprocessing**

The code begins with loading the necessary libraries and data. The data is loaded from a CSV file and basic preprocessing steps are performed, including checking for missing values and scaling the data using Min-Max Scaling and Standardization.

**Section 2: Time Series Analysis and Modeling**

**ARIMA Modeling:**

* ARIMA modeling is performed on the preprocessed data.
* The stationarity of the time series is checked using the Augmented Dickey-Fuller (ADF) test.
* Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) plots are used to identify parameters for the ARIMA model.

The ARIMA model is trained, evaluated, and used for forecasting.

**SARIMA Modeling:**

* Similar steps as ARIMA modeling are followed, but SARIMA (Seasonal ARIMA) modeling is used here.
* Seasonal parameters are identified using ACF and PACF plots.
* The SARIMA model is trained, evaluated, and used for forecasting.

**Exponential Smoothing (ETS) Modeling:**

* Exponential Smoothing (ETS) modeling is performed on the data.
* Different variants of the ETS model are explored, and the best-fitting model is selected.
* The ETS model is trained, evaluated, and used for forecasting.
* Support Vector Regression (SVR) Modeling:
* Support Vector Regression (SVR) is applied to the data.
* The model is trained, evaluated, and used for forecasting.

**Long Short-Term Memory (LSTM) Modeling:**

* LSTM modeling is performed, where sequences of data are used to forecast future values.
* The LSTM model is trained, evaluated, and used for forecasting.

**Hybrid Model:**

* A hybrid approach combining ARIMA and ANN (Artificial Neural Networks) is implemented.
* ARIMA forecasts are used as input features for the ANN model.
* The hybrid model combines the forecasts from ARIMA and ANN to generate final predictions.

**Section 3: Streamlit App**

* A Streamlit web application is created for interactive forecasting.
* Users can select different models (ARIMA, SARIMA, ETS) and specify the number of days for forecasting.
* Model results, including summaries and forecasted values, are displayed dynamically in the app.

**Overall Evaluation:**

* Each model's performance is evaluated using appropriate metrics such as Mean Squared Error (MSE) and Mean Absolute Error (MAE).
* The strengths and limitations of each modeling approach are discussed.
* Recommendations for model selection based on the data characteristics and forecasting requirements are provided.

**Recommendations:**

* Based on the evaluation results, recommendations are made for selecting the most suitable forecasting model(s) for the given dataset.
* Suggestions for further improvements or alternative modeling techniques are offered.